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Institutionalisation of Enterprise Resource Planning Systems: An Integrative Framework

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Abstract

The importance of studying institutional view and theories in the context of contemporary business organisations have been emphasized by many researchers. However, the literature overlooked the institutional elements which are influencing technology implementation in organisations. This study aims to investigate the issues posed to ERP implementation through the lens of technology institutionalisation perspective by considering institutional theory, institutional pressures, and other organisational and technological factors. This research in progress paper describes the research framework for ERP institutionalisation that provides an integrative view of how ERP is implemented, assimilated, and institutionalised within the organisations. This framework brings together the effects of various well-defined IS theories into a unified and integrated structure. Moreover, this paper looks at a broad sample of current IS literature on ERP systems' successes and failures over various stages of institutionalisation process. Based on the results of literature analysis, tackling an ERP institutionalisation, for any organisation, requires some introspection and true assessment of priorities, objectives and external business environment of the organisation.

Keywords:

Enterprise Resource Planning (ERP) system, ERP assimilation, ERP institutionalisation, Institutional theory, ERP implementation issues

INTRODUCTION

Enterprise resource planning (ERP) systems are complex systems because not only that they help the organisation transform organisational processes through automation and integration (Markus and Tanis 2000), these systems also enable advanced features like business intelligence and helping integration of business value chain that improves competiveness of the organisation (Benders *et al.* 2006; Ugrin 2009). There are many classifications of ERP implementation but within an ERP context, implementation can be defined as a process that begins when the decision to use ERP is taken and ends when system is accepted and used with confidence (Bajwa *et al.* 2004). The process of ERP implementation, thus, is not a decision to be taken lightly by any organisation as it does not entail simply installing a piece of software. Implementation of ERP in an organisation is a continuous process aimed at assimilation of technology within the organisational institutional environment. ERP assimilation could be defined as the extent to which the organisation progresses from understanding the ERPs' potential and functionalities to mastering and deploying them in their key value chain processes (Bajwa *et al.* 2004; Kouki *et al.* 2006). Once the organisation is making optimal advantage of ERP, its use will be taken for granted by the organisational stakeholders to contribute to the value of the organisation. This taken-for-grantedness to provide value in day-to-day operations results in institutionalisation of the ERP system. ERP institutionalisation, thus, occurs when its usage becomes stable, routinized and embedded within the organisation's work processes and value chain activities in ways that organisational actors could not think about doing their day-to-day job responsibilities without using it (Gosain 2004; Lyytinen *et al.* 2009; Ugrin 2009; Maheshwari *et al.* 2010).

Institutional theory has been applied in the context of contemporary business by various researchers (Zucker 1987; Powel and DiMaggio 1991; Davis and Marquis 2005; Mignerat and Rivard 2009). However, comparing to tremendous amount of studies on the effects of coercive, normative, and mimetic on technology implementation, assimilation, and institutionalisation (such as Lammers and Barbour 2006; Delmestri 2007; Ugrin 2009; Weerakkody *et al.* 2009; Maheshwari *et al.* 2010; Jei and Sia 2011; Currie 2011), little attention has been given

on studying other institutional elements which are influencing this process such as the culture of organisation, technology characteristics like strategic alignment and technology standardization (Benders *et al.* 2006). According to the institutional view and theories, there are various sub institutions operating in a broader environment of organisation, such as organisational culture, technological infrastructure, social structure, and external environment. The organisation thrives on the mutual interactions of these sub-institutions and establishes its legitimacy (Zucker 1987; Powell and DiMaggio 1991; Scott 2001). Technology implementation is at the core of these interactions, which physically endorse and socially compose technology. In fact, technology works as the binding factor that shapes organisations and gives them their existing form and legitimacy by integrating together these sub-institutions. The form and legitimacy brings social approval, acceptability, credibility, and cultural persistence which increase the probability of organisational survival (Zucker 1987; Powell and DiMaggio 1991; Mignerat and Rivard 2009). This research aims to study how ERP systems are institutionalised, so as to develop an understanding of success factors and challenges of ERPs' implementation, assimilation, and institutionalisation through continuous interfacing with technical, organisational, environmental, social, cultural, informational, and other institutional factors. Furthermore, this research in progress paper introduces an ERP institutionalisation framework which is developed for this research. This framework brings together various well-defined information system (IS) theories into a unified and integrated structure.

The rest of this paper is organized as follow. The next section proceeds to introduce ERP institutionalisation process and its various stages followed by a thorough review of current IS literature on ERP implementation issues and theories. The following section describes ERP institutionalisation framework and its related research questions. The final sections provide a discussion on learning from this research and the proposed research methodology to answer research questions followed by conclusions of this study.

LITERATURE REVIEW

In this section, first a review of ERP institutionalisation process and its various stages is presented. Then, a thorough review of literature on key issues which organisations are faced through ERP implementation, assimilation, and institutionalisation is presented, followed by an overview of IS theories related to ERP adoption, assimilation, and institutionalisation in the last section.

ERP Institutionalisation

After ERP is implemented and assimilated in an organisation and its usage becomes routinized and embedded within the organisation's day- to-day work processes, it leads to institutionalisation of ERP (Bajwa *et al.* 2004; Maheshwari *et al.* 2010; Pishdad and Haider 2013). This research follows the three-stage technology assimilation process (initiation, adoption, and routinization) proposed by Zhu *et al.* (2006).

In the initiation stage of this process, the ERP needs and problems are identified and prioritized. Then the organisation's technical and nontechnical environment is assessed for the suitability of an ERP solution, which facilitates in change management and alignment of technology with existing technological infrastructure as well as organisational environment. At this stage, the focus of introducing ERP system to organisation is on improving organisational performance (Rogers 2003). The second stage of ERP institutionalisation process is adoption wherein the decision to use the ERP system is made (Rogers 2003; Bajwa 2004), and the resources required for general deployment of this technology are allocated based on the level and scope of adoption decision. This facilitates the widespread usage of ERP system. After an ERP is implemented, it has to be accepted, adapted, and routinized in the organisational life by the organisational stakeholders (Lyytinen *et al.* 2009; Maheshwari *et al.* 2010). However, most organisations fail what Fichman and Kemerer (1999) term as an 'assimilation gap', which is the lag between widespread use of ERP system and the adoption decision. This lag occurs because of the insufficient knowledge of the organisation and its members to leverage the system. As a result, the implemented ERP system is not aligned with the organisational environment, so it fails to assimilate completely throughout the organisation. As a way to bridge up this gap, routinization emerges as the last stage of this process by which ERP system is widely used as the integral part of the organisation. During this stage the effects of uncontrolled problems in previous stages appear due to the fact that users start the exploration and evaluation of the system (Gosain 2004; Kouki *et al.* 2006).

ERP Implementation Issues and Challenges

The Google Scholar, PROQUEST, Academic Search Premier, Business Source Complete and Computers and Applied Science Complete via EBSCOHOST, Emerald Management and ScienceDirect (post 2008) databases were searched for 'ERP/ enterprise resource planning' AND 'implement' AND 'challenge/ issue/ success'. This search revealed that issues surrounding ERP implementations concern failures to deliver expected business benefits, failures to deliver benefits on time and/or within budget or failures to provide sufficient return on investment. Factors identified from articles' search are summarized in table 1. The most cited factors are highlighted in different colour.

Table 1: Results of ERP Implementation Issues- Literature Overview

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Appropriate Business and IT Legacy Systems		√	√					√		
Business Process Re-engineering	√	√	√		√				√	
Business Plan and Vision	√	√	√							
Change Management Programme and Culture	√	√	√	√	√		√	√	√	
Clear Project Goals and Milestones			√		√					√
Country-Related Functional Requirement		√					√			
Customization	√	√	√	√	√			√		√
Data Quality and Accuracy		√			√	√	√	√	√	√
Enterprise -Wide Communication and Cooperation	√	√	√		√		√	√		√
ERP Interface with other Information Systems					√		√		√	
External Consultant Support			√	√			√			
Functional Fit		√			√				√	
Hardware and Infrastructure Crashes					√		√			
Internal Integration				√	√		√	√	√	
Knowledge Transfer, Sharing and Management	√	√		√	√		√		√	√
National Culture		√								
Organisational Culture	√	√	√							√
Organisational Fit		√			√				√	√
Organisational Structure and Characteristics	√	√								
Performance Management, Measurement and Monitoring	√	√				√	√			
Project Champion	√	√	√	√						
Project Management and Evaluation	√	√	√							√
Project Team Composition, Competence and Compensation	√	√	√	√	√			√		√
Project Team Leadership and Team Work		√		√	√					
Resources (such as budget and employees)				√			√		√	√
Software Selection			√							
Technical Analysis, Testing and Troubleshooting	√	√	√		√	√	√	√		
Strategic Fit							√	√		
	1	2	3	4	5	6	7	8	9	10
Suitable IT Governance Structure						√				
Top Management Support	√	√	√	√	√		√	√		√

Users Training and Education		√	√	√	√	√	√	√		√
User Acceptance/ Resistance					√		√		√	√
User Involvement and Qualification	√		√		√					√
Vendor Support and Tools		√	√	√	√		√		√	√

Legend:
1 = Bourgault and Pellerin (2009)
2 = Ngai *et al.* (2008)
3 = Dezdar and Sulaiman (2009)
4 = Brown and Vessey (2011)
5 = Maheshwari *et al.* (2010)
6 = Usher and Olfman (2009)
7 = Peng and Nunes (2009)
8 = Momoh *et al.* (2010)
9 = Seddon *et al.* (2010)
10 = Chang *et al.* (2008)

Dimensions of Technology Institutionalisation

Organisations react to institutional forces in many different ways according to their organisational structure, culture, stockholders, and field of business (Scott 2001). There exist several approaches to institutionalism, i.e. normative, rational choice, historical, empirical, and constructivist. Based on the normative institutionalism, 'logic of appropriateness' is the best way to describe the behaviour of individuals within an organisation; as normative standards, moral templates, and cognitive scripts are the major social repositories of values shaping the actions of those acting within them (Hall and Taylor 1996; Peters 2000). Rational choice institutionalism views institutions as arrangements of rules, inducements and incentives, which influence members of institutions to behave appropriately in response to basic components of institutional structure to maximize their utilities. However, some preferences of the individuals in responding to rules, inducements and incentives remain unchanged (Hall and Taylor 1996; Peters 2000; Shepsle 2005). The third approach to institutionalism is historical, which relies on the concept of 'path dependency'. The idea behind this concept is that the inception of an institution will have continued effects over its behaviour for the remainder of its existence, which explain sustainability and persistence of strategies, structure and actions. Empirical institutionalism answers the questions regarding organisational differences in strategy and policy choices and institutional stability according to their formal and informal structures (Hall and Taylor 1996; Peters 2000; Pierson and Skocpol 2005). Finally, constructivist institutionalism is the newest approach to institutional analysis which describes the role of ideas and discourses in organisational politics. This provides a more dynamic approach to institutional change than the previous mentioned approaches (Schmidt 2008).

Autonomy, adaptability, complexity, coherence, congruence, and exclusivity are some criteria for evaluating the degree of institutionalisation in an organisation (Goetz and Peters 1999; Peters 2000). Our comprehensive list of criteria that could be used to assess/ assist in institutionalisation of technology in an organisation is described in table 2.

Table 2: Factors Influencing Technology Institutionalisation- Literature Overview

Criteria	Description
Autonomy	This concept indicates the existence of the institutionalisation within an organisation and refers to the capability of an organisation to make and implement decisions independently from other organisations or institutions, like autonomous sources of revenue and budgets
Adaptability	This concept demonstrates the capability of an organisation in adapting to the environmental changes and shaping it
Complexity	This concept refers to the capability of an organisation to handle organisational transactions and structure internally and externally to accomplish organisational goals and missions
Coherence	This concept concerns the capability of an organisation to decide and develop procedures to process tasks and beliefs and to filter any diversions from those

Congruence	This concept refers to the degree to which the institutions and the social relations and values they are supported to regularize and maintain are compatible and matching to each other
Exclusivity	This concept reflects the intensity of functional and non-functional competition among institutions. In circumstances which there are little or no competition, organisations have more chance to be survived
Program flexibility	This factors refers to the extent to which the program can be modified over time to adapt to the organisation and become institutionalised
Champion	The champion have access to upper management as well as influence on, or control over day-to-day program operations which help secure resources for its continuation
Fit with the Organisations Mission	Technologies which fit into existing tasks and procedures and contributing to the organisation's goals are more likely to receive internal support and resources. Besides, they have more chance of having support from managers, and operational staff members
Perceived Benefits	The benefits to staff members and/or clients that are readily perceived. Such benefits are not necessarily documented via formal evaluation
Support from Stakeholders	The more support from stakeholders of an organisation, the more possibility of technology usage and sustainability. New funding is mandatory for this purpose
Discourse	Discourse is the interactive process of conveying ideas. The institutions of discursive institutionalism are not external-rule-following structures but rather are simultaneously structures following a "logic of communication," which explain how institutions are created, exist, change or persist
Cultural persistence	The greater the general uniformity, maintenance and resistance to change of cultural understanding, the greater degree of institutionalisation expected

Theoretical Background

There is significant theoretical support for factors influencing ERP institutionalisation success/ failure. Diffusion of innovation (Rogers 2003) is a process in which an innovation is communicated through certain channels over time and within a particular social system. The proportion of the population adopting ERP technology is approximately distributed normally over time as individuals possess various degrees of willingness to adopt technologies. Rogers (2003) argues that people judge a technological innovation based on their perceptions of five attributes, i.e., relative advantage, complexity, compatibility, trialability, and observability. Task–technology fit theory (TTF) and technology acceptance model (TAM) are two main models of information technology utilization behaviour which provide theoretical basis for exploring the factors affecting technology utilization and its link with user performance. Although these two models have overlapping perspectives on utilization behaviour, they offer two various views on technology implementation (Pagani 2006). TTF (Goodhue and Thompson 1995; Premkumar *et al.* 2005; Zigurs and Khazanchi 2008) explains how technology leads to performance, if the capabilities of the technology match the tasks performed by user. Some researchers conceptualize this fitness as functional fit in ERP projects, which is the extent to which the functional capabilities embedded and configured within an ERP system matches the functionality that an organisation needs in order to operate in an effective and efficient way (Benders *et al.* 2006; Seddon *et al.* 2010). On the other hand, TAM, theory of reasoned action, and unified theory of acceptance and use of technology (UTAUT), all study behavioural elements affecting individual's intention to use a system, and actual system use (Davis 1989; Venkatesh *et al.* 2003; Wixom and Todd 2005). User attitude towards the ERP system (beliefs, habits, affect), along with social norms, and other situational factors lead to increased utilization and performance of system usage (Cohen 2010). External variables like system quality, information quality, service quality, and organisational factors affect user satisfaction with technology, and consequently influence beliefs about the consequences of using it (Wixom and Todd 2005).

The technology-organisation-environment (TOE) framework believes technology implementation, assimilation, and institutionalisation process is influenced by the technological, organisational, and environmental context of the organisation. This framework has been thought to be a good theoretical angle for defining IT deployment factors which are rooted in technological, organisational, or environment contexts and thus are widely adopted by IS researchers (Tornatzky and Fleisher 1990; Kuan and Chau 2001; Schmitt *et al.* 2007; Wang *et al.* 2010; Abu-Khadra and Ziadat 2011). The technological context consists of both internal/external technologies such as equipment and processes. Technical advantages, compatibility and complexity are some features of this context.

The organisational context embodies cultural values and assumptions, organisational learning capabilities, and the characteristics of organisational resources and routines, such as agility and degree of specialization, centralization, and formalization. The environmental context is the arena in which the organisation conducts its business and concerns the size and structure of the industry, such as the macroeconomic context, the firm's competitors, and the regulatory environment. In summary, the way an organisation sees the need for, searches for, and adopts technology is influenced by these three elements (Schmitt *et al.* 2007; Wang *et al.* 2010; Abu-Khadra and Ziadat 2011).

Institutional theory has been applied to technology management paradigm by researchers (Scott 2001; Teo *et al.* 2003; Greenwood 2008; Mignerat and Rivard 2009; Weerakkody *et al.* 2009; Currie 2011). Activities involving in development and use of technologies in general and ERP systems in particular are subject to social, cultural, organisational, technical, and other institutional pressures. These pressures could be from external sources such as competitors, suppliers, customers, and government agencies as well as from legitimated norms, rules, and logics embedded within the organisation. Organisations may respond to these pressures by conforming to technology mandates, or modifying their business practices to fit the technology. As a result, organisations address the opportunity for social approval and/or legitimacy.

Resource Dependency Theory (RDT) aims to study the effect of external resources of organisations on their behaviour, as procurement of these resources have direct influence on organisation's strategic and tactical management (Pfeffer and Salancik 2003). In the context of ERP implementation, it mainly emphasizes ERP solutions on the cloud. According to this theory, the lack of essential internal resources of an organisation is the main cause of its inclination to enter to an exchange relationship. This theory is also suggests organisations attempt to minimize their dependence on other partners, or try to change their dependence relationship by making other organisations to depend more on them. In this way, they will achieve more power because resources are the basis of power which is viewed as an organisational success. On the basis of RDT, organisation's inclination to adopt cloud ERP solutions is a cause of their desire to utilize resources which are not available internally. Some examples of these resources could be higher elasticity, economies of scale, virtualization capabilities, and possibly more expertise in running IT services or software. Finally, ERP system is embedded in the complex social contexts, which heavily influence ERP assimilation. The use of ERP system is shaped, designed, constructed, and modified by the interests, values, and assumptions of a wide variety of communities of developers, investors, users, and other actors involved in it (Mackenzie and Wajcman 1985; Law 2004; Xue *et al.* 2004). In line with this issue, the theory of social shaping of technology explores the effects of social, organisational, and cultural factors on the content of technology and the processes involved in the introduction of technology to an organisation. The technological and social contexts of ERP implementation, thus, cannot be treated as separate phenomena; rather the definition of ERP system must become embedded within the social arrangements (Law 2004; Chang *et al.* 2008; Kwahk and Ahn 2009).

ERP INSTITUTIONALISATION FRAMEWORK AND RESEARCH QUESTIONS

The main question of this research is 'How ERP systems should be assimilated, legitimized, institutionalised, and improved within organisations?' In the rest of this section, the research framework (figure 1) and its fundamental elements are elaborated, and the sub-questions arise from each layer are also discussed.

The most inner layer of this framework is ERP assimilation process. As explained before, the three-stage innovation assimilation process (initiation, adoption, and routinization) proposed by Zhu *et al.* (2006) is used here. The fundamental question at this stage is 'How ERP systems are assimilated within organisations?'

The second layer of the suggested framework is ERP assimilation success factors. At this stage, organisation needs to ascertain how ERP is shaped with the social, organisational, cultural, and technical contexts of the organisation. Technological and social contexts of ERP assimilation cannot be treated as separate phenomena; rather the definition of ERP system must become embedded within the social arrangements (Kwahk and Ahn 2009). Critical Success Factors (CSFs) as key areas where 'things must go right' for the ERP implementation to be successful should not only considers technical aspects but also contextual issues including social and cultural impact on the interaction between people and the ERP systems (Xue *et al.* 2004). Diffusion of innovation (Rogers 2003), technology acceptance model (Davis 1989), task-technology fit (Goodhue and Thompson 1995), technology-organisation-environment framework (Tornatzky and Fleisher 1990), social shaping of technology (Mackenzie and Wajcman 1985; Law 2004), and resource dependency theory (Pfeffer and Salancik 2003) are the set of theories used to form this layer. At this stage, the interactions between technical, organisational, social, cultural, and competitive aspects become institutionalised within the organisation environment provide for the success factors of ERP assimilation process. Here the question arise is 'what are CSFs in various stages of ERP assimilation process?'

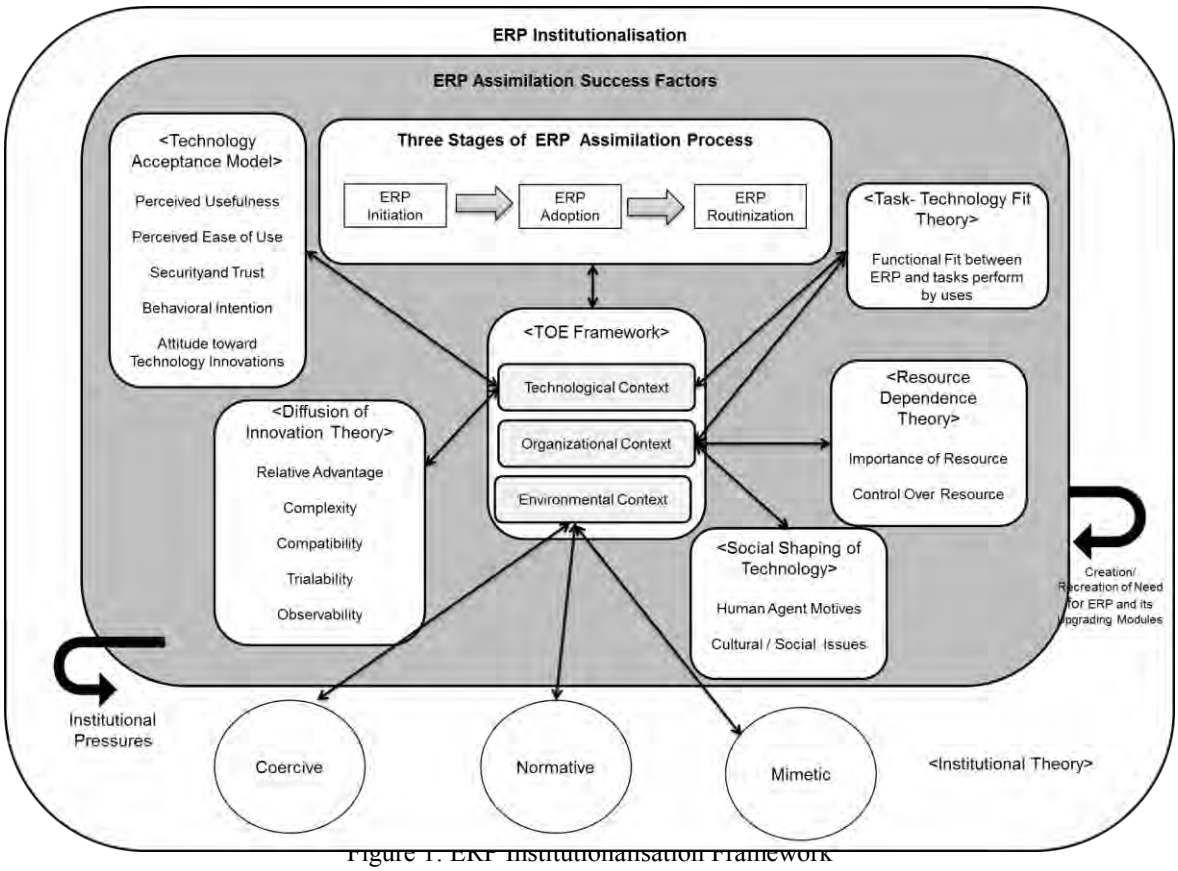

Figure 1: ERP Institutionalisation Framework

ERP institutionalisation is the third layer of suggested research framework. When ERP is institutionalised, it is taken for granted by its users within the organisation. This means that they are comfortable with ERP and can employ its features effectively in their routine activities without requiring functional consultant or coach support. At this stage, acting in compliance with the institution is viewed as logical by those who share it (Zsidisin *et al.* 2005; Ugrin 2009; Seddon *et al.* 2010; Maheshwari *et al.* 2010). Institutional pressures push organisations to adopt shared notions and routines. In fact, the interpretation of intention to adopt technology and the prevailing context of the organisation is affected by its perception of these pressures. Coercive, normative, and mimetic mechanisms make ERP systems to be legally sanctioned, morally governed, and culturally supported (Scott 2001). Coercion is a force exerted on an organisation by other external institutions upon which it is dependent such as suppliers, customers and governmental agencies. Norms are imposed on organisations by professionals as the acceptable way of doing things. Mimetic isomorphism is particularly the case in contexts where there is considerable uncertainty about the consequences of actions. Thus, the actions of other earlier movers become reference points to guide actions. In response to institutional pressures, the need for ERP system will be created/ or recreated, which affects various stages of ERP assimilation and its success (Kwahk and Ahn 2009; Peng and Nunes 2009; Maheshwari *et al.* 2010). However, it is noteworthy that this research is not only limited its view to study the effect of coercion, norms and mimesis behaviour, rather it aims to investigate other institutional elements which are influencing ERP institutionalisation as well. The sub-question at this stage is, therefore, 'How ERP systems become institutionalised in organisations'. In general, considering all these influencing factors and their effects, an organisation could facilitates its readiness over various stages of ERP assimilation, i.e., when an ERP system introduces, starts to use, becomes dominant, maintained and improved within organisation.

DISCUSSION

Institutionalisation of ERP is a recent phenomenon and this field is far for being matured. Once the organisation is making optimal advantage of ERP, its use will be taken for granted by the organisational stakeholders to contribute to the value of the organisation. This taken-for-grantedness and/or technical, social, organisational, and environmental legitimacy to provide value in day-to-day operations results in institutionalisation of the ERP system. Therefore, stability, routinization, cultural persistence, and taken-for-granted assumptions are at the core of social actions when a practice becomes institutionalised within the organisation.

This research is based in Australian settings where they have been no previous study of institutionalisation of technology. This research in progress paper contributes to the extant IS implementation literature by using a set

of well-known IS theories to construct proposed ERP institutionalisation framework. Diffusion of innovation, technology acceptance model, task-technology fit, technology-organisation-environment framework, social shaping of technology and resource dependency theory are the set of theories used to form this framework. The suggested framework emphasizes the character, shaping, and use of technology through continues interfacing with organisational, social, cultural, environmental, and other institutional factors. It takes into account the pre-implementation, implementation and post-implementation stages of ERP assimilation into an integrated structure. Furthermore, this paper looks at a broad sample of current IS literature on ERP systems' successes over various stages of institutionalisation process.

This is a concept paper that proposes research framework which is yet to be validated through case study. As the next step in this research, this framework will be validated in three or four Australian organisations. Methodologically, this research will follow a qualitative interpretive approach with an exploratory case study method. Case study research is an appropriate strategy for answering to 'how' and 'why' questions which investigates a contemporary phenomenon within its real-life context especially when the boundaries between these two concepts are not clearly evident (Eisenhardt 1989; Yin 2009). The case studies will be selected from different Australian organisations which use ERP systems in their organisations. These organisations represent different types of ERP implementation and assimilation arrangements, where these organisations either buy customized ERP solutions from a foreign vendor or local vendors, opt for a complete implementation, or implement ERP solutions on the cloud.

CONCLUSION

Contemporary business organisations are more concerned about the physical implementation of technology rather than the factors and the cause and effects that help shape the use of technology in the organisation and help technology as well as other institutions within the organisation to grow and mature in relation with each other. Institutionalisation of technology is not an independent process, but it is dependent on other sub institutions within the organisation. Therefore, successful institutionalisation of technology can only be interpreted within particular economic, competitive, technical, organisational, and cultural circumstances. In other word, institutionalisation of technology in an organisation in a particular way is different from the way the same technology has been institutionalised by another organisation in another way.

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